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ABSTRACT

The readability level of passages from three subtests of the Iowa Tests of Educational Development (ITED), Forms X-6 and Y-6, were compared with the readability level of passages selected from the Des Moines Register, Reader's Digest, Time, Newsweek, Saturday Review, and 18 high school textbooks from the fields of social studies, science, and language arts and literature. The three ITED subtests analyzed were Concepts and Reading Materials in the Social Sciences, Background and Reading Materials in the Natural Sciences, and Literary Materials. Four readability formulas were used to determine the readability levels: the Dale-Chall formula, the Flesch formula, Gunning's FOG Index of Readability, and McLaughlin's SMOG Readability Index. Results indicated that the readability levels of the passages in the ITED social studies, science, and literary subtests were comparable to materials which high school students are likely to encounter both in and out of the classroom. (BW)

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Readability Levels of the
Reading Passages in the ITED:
Final Report

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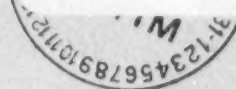
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Introduction¹

The reading level of instructional materials has always been a concern of teachers and other educators. The appropriate matching of reader and learning material is an important part of the teaching process. It seems axiomatic that such a matching will enhance learning.

Standardized test publishers have likewise always been concerned with the reading level of their test materials. If the reading level of the test is too "high," students may become frustrated or discouraged. If it is too "low," they may become indignant or impatient. In either case student motivation may suffer, and the validity of the results for many purposes may be adversely affected.

In this paper we are concerned with the reading level of parts of one particular standardized achievement test battery, the Iowa Tests of Educational Development (ITED)². The ITED, like most other achievement batteries, employs a measuring procedure in certain subtests which depends heavily on the reading ability of the student. This procedure involves the presentation of a reading passage on a particular topic, followed by a set of questions whose content is derived from the reading passage. Major portions

¹Major portions of the first three sections of this report are taken from: Forsyth, R. A. and Michaels, L. Readability Levels of the Reading Passages in the ITED: A Preliminary Report. Iowa Testing Programs, Research Report #5. August, 1975.

²The concern here is with Forms X-6 and Y-6 of the ITED (Iowa Testing Programs, University of Iowa, Iowa City, 1972).

of three subtests of the ITED are organized in this manner: Concepts and Reading Materials in the Social Sciences (SS); Background and Reading Materials in the Natural Sciences (NS); and Literary Materials (L). A fourth subtest, Correctness and Appropriateness of Expression (E), also uses reading selections which the student is to analyze critically with respect to punctuation, capitalization, usage, diction, phrasing, and organization.

Since a large part of the ITED utilizes reading passages, it is important that the reading level of these passages be appropriate for the students who take the tests. If many or most of these passages are judged too difficult or too easy, the validity of the tests for assessing student growth in these areas and for other purposes is seriously limited.

In a recent investigation of the reading levels of the ITED, Forsyth and Michaels (1975) concluded that, in general, the reading levels of the ITED passages were similar to other materials students would be expected to read. Their study utilized previously published data on the reading levels of various adult reading materials and selected textbooks to evaluate the appropriateness of the reading levels of the ITED passages. However, as Forsyth and Michaels note, (pp. 27-28) there were several limitations to their investigation. Some of their reading materials were not entirely satisfactory, either because the materials were somewhat out-dated or because the materials were not of the comparative nature necessary for making valid evaluations. Also, because these

reading materials came from several different sources, there was a possibility that slightly different procedures for assessing the reading levels of the different materials may have been used. The present study is not hampered by the limitations of this earlier study. The major purpose of the two studies, however, is the same: to evaluate the appropriateness of the reading levels of the ITED reading passages for high school students.

In the next section we discuss definitions of "readability," a term usually employed when evaluating the reading difficulty of written materials. In this section we also present various methods of measuring readability and the advantages and limitations of the particular method used in this study. The third section describes how the reading levels of the ITED passages will be interpreted. The procedures used for measuring the readability levels of the reading materials in this study are discussed in the fourth section. Finally, in the last major section, the actual readability levels for the ITED reading passages and the other reading materials utilized in this study are given, and the implications of these results are examined.

Definition and Measurement of Readability

The term readability is used in several different ways, but, as Gilliland writes (1972, p. 12),

Most readers will be able to make an intelligent guess as to how 'readability' might be defined. It has to do with the interest or the ease with which a book can be read.

Here the concern is exclusively with the ease of understanding the reading passages of the ITED.

Ease of understanding is a function of several factors. As Chall states (1958, p. 7),

The subject matter itself may . . . affect comprehensibility of the material. Books on abstract complicated subjects usually will be harder to read than those which discuss relatively familiar ideas. Factors of format may also affect ease of understanding. Good paragraphing, introductory phrases in bold type, and short chapters probably promote the reader's effort to grasp the author's thoughts.

Although interest, format and style may all influence ease of understanding, Gilliland (1972) notes that measurement of readability has most frequently been made in terms of style of writing. Indeed, most measures of readability have employed "characteristics of words and sentences" (Gilliland, 1972, p. 84). In this paper, we have chosen to examine the readability of the ITED from the viewpoint of ease of understanding due to style.

The measurement of readability can be implemented in a wide variety of ways. Gilliland (1972, p. 83) notes that the five methods listed below have been widely-used:³

- (1) subjective assessment
- (2) objective question and answer technique
- (3) formulas based on sentence structure and vocabulary
- (4) tables and charts
- (5) sentence completion and cloze procedure

³Gilliland (1972, Chapter 8) and Klare (1963, Chapter 4) discuss these methods in some detail.

Of these five procedures, the formulas more than any other procedure are intended

- (1) "...to provide quantitative, objective estimates of difficulty for pieces of writing without requiring readers to take tests of any kind on them" (Klare, 1963, p. 33), and
- (2) "...to be general enough to provide estimates over a range of applicability and of difficulty" (Klare, 1963, p. 34).

Given these qualities, formulas appear to be very desirable as measures of readability. Indeed, as Razik (1969, p. 317) states,

While this approach [formulas] neglects such factors as the complexity of ideas, sentence and paragraph construction, and individual differences, it has proved to be a relatively valid measure of readability, if the teachers', reading specialists', and librarians' judgments are used as the criteria.

Gilliland observes that formulas "are the most frequently produced and widely accepted methods for measuring readability ..." (1972, p. 89). In this study the readability of the ITED reading passages and other reading materials were measured using such formulas.

But what exactly is a readability formula? In essence, such a formula is a weighted combination of measurable characteristics of a reading passage which seem logically related to its comprehensibility. In general, these characteristics bear on the sophistication of the vocabulary used by the writer and the complexity of his (her) sentences. Examples of some of the more commonly used characteristics are:

- (1) percent of difficult words (e.g., percent of words not appearing on some designated word list) in a passage
- (2) percent of polysyllabic words (words of 3 or more syllables) in a passage
- (3) average sentence length or average number of words per sentence in a passage
- (4) number of syllables per passage

In refining the weights for readability formulas, researchers have related each characteristic to other readability criteria. Those elements which predict a criterion based on student ability to answer comprehension questions, for example, are presumed to "belong" in a readability formula.

Gilliland describes how formulas are generally applied (1972, p. 89):

The application of a formula usually involves the selection of a sample from a text, the counting of some easily identifiable characteristics, such as the average number of words per sentence or the proportions of polysyllabic words in the sample, and then performing a calculation to produce a score. This score indicates the difficulty of the sample text. If the sampling procedures are carefully followed, then it is assumed that this score reflects the difficulty of the whole text.

While formulas may represent the most valid and reliable means available to assess readability, they are not without serious limitations.

First, as has been noted before, readability formulas measure only style, not subject matter or format. Furthermore, they measure only the style's difficulty, not other qualities such as organization, imagery, or mood (Klare, 1963, p. 25).

Second, a formula may be inaccurate due to errors in sampling or application. Analysts making counts or calculations may misunderstand directions or use a sampling technique other than the type recommended.

Third, readability scores are generally reported as grade levels; such an interpretation of these scores, however, is probably inappropriate. As Fry states (1968, p. 515),

... there are not vigorous standards of just what is 4th grade difficulty as opposed to 5th grade difficulty. There seems to be some loose sort of agreement between publishers and educators which is based on experience and perhaps a little on test data as to what grade level designations mean. However, even standardized test data are not exact.

Some formula developers have tried to set up their own interpretations of what a "4th grade difficulty" is. Typical is Flesch (1948, p. 222):

The criterion used in the original formula was McCall-Crabbs' Standard Test Lessons in Reading. The formula was so constructed that it predicted the average grade of a child who could answer correctly three-quarters of the test questions asked about a given passage.

This kind of criterion can easily create more problems than it can solve. Can anybody determine all possible questions that could be asked about a passage so that it can be shown that a child will answer three-quarters of them correctly? A criterion of this sort is bound to lead to confusion.

Given the different definitions of the criterion, the different components used in the formulas, and the errors due to sampling and application that can occur, it is not surprising that "... the

various formulas do not necessarily give comparable grade-level results even though they frequently show high intercorrelations" (Klare, 1963, p. 120).

While the limitations noted above are inherent in the formulas and cannot be overcome, this study has tried to compensate for them. First, it does not report formula scores as grade levels. Rather, interpretation rests on the comparison of values computed for a wide variety of reading materials, the selection of which is discussed shortly. Second, comparisons among materials are made on the basis of four formulas rather than one. These four formulas are:⁴

- (1) Dale-Chall, as revised by Powers, Sumner, and Kearl (1958, p. 101):
Readability = $3.2672 + .0596a + .1155b$
where a = average sentence length in words
b = percent of words not appearing on the Dale list of 3000 words (Dale and Chall, 1948b, pp. 45-54)
- (2) Flesch, as revised by Powers, Sumner, and Kearl (1958, p. 101):
Readability = $.0778a + .0455c - 2.2029$
where a = average sentence length in words
c = average number of syllables per 100 words
- (3) Gunning, as revised by Powers, Sumner, and Kearl (1958, p. 101):
FOG Index of Readability = $.0877a + .0984d + 3.0680$
where a = average sentence length in words
d = percent of polysyllables [words of three or more syllables]
- (4) McLaughlin (1969, p. 643):
SMOG Readability Index = $3.1291 + 1.0430\sqrt{e}$
where e = number of polysyllables per 10 sentences

⁴These are four of the more popular formulas. Klare (1963 and 1974-75) discusses other formulas in some detail.

Interpretation of Readability Levels of ITED Passages:
Selection of External Materials

In the preceding section we noted that interpreting readability scores as grade levels appears questionable. An alternative procedure for interpreting these scores was therefore developed. This alternative involved a normative approach, that is, the comparison of the readability levels of the ITED passages with the levels of materials from other sources. In deciding what sources should be used as reference points for this purpose, consideration was given to subject matter covered within each subtest and to the differences among subtests. The philosophy of the ITED also influenced the type of external material selected for comparison. As stated in the Manual for Teachers, Counselors, and Examiners:

The Iowa Tests of Educational Development provide measures of abilities that are important in adult life and constitute the foundation for continued learning ... They require the student to use his knowledge and skills in analyzing materials that he probably has not encountered previously. Thus, the tests are designed to measure how well the student can apply his education in new settings. (Iowa Testing Programs, 1972, p. 1)

Since the tests are intended to measure abilities important in adult life, it seemed reasonable that the readability levels of the reading passages should be compared to the readability levels of those materials a majority of adults are likely to encounter (e.g., newspapers and magazines). Moreover, since each test includes passages drawn from several subject matter areas, it was deemed desirable that the external materials reflect a comparable variety of content areas.

The external materials selected were the Des Moines Register, Reader's Digest, Time and Newsweek, and Saturday Review. The Des Moines Register was selected because of its wide circulation throughout the state of Iowa. Reader's Digest was chosen as a widely-read monthly digest; Time and Newsweek were selected as widely-read weekly news magazines; and Saturday Review was chosen as a widely-read weekly magazine of a more academic nature. All these periodicals contain articles dealing with social studies, science, and literature and personal expression, and hence are directly relatable to each of the ITED subtests under consideration.

An attempt was made to obtain early February, 1975, issues of all the materials examined. A list of the issues used is given in Table 1.

Table 1

Newspaper and Journal Issues Used in this Study

<u>Des Moines Register</u>	February 1 - 7, 1975
<u>Reader's Digest</u>	January and February, 1975
<u>Time and Newsweek</u>	February 3 and 10, 1975
<u>Saturday Review</u>	January 25 and February 8, 1975

It was decided to obtain five samples from each periodical in each of the three areas: social studies, science, and literature. For example, from the Reader's Digest five articles dealing with social studies topics, five articles dealing with science topics, and five articles that might be classified as either literature or feature material were selected.

The general procedure followed when sampling from each periodical was to first identify and number all articles judged to fit in each category. Subjective judgment was used to determine if the subject matter was appropriate to the category. Articles under 200 words or over 2000 words were not considered. Then, within a given area, articles were randomly selected from among the numbered articles.

In the science category, five articles were randomly obtained from those in Reader's Digest and five from those in Time and Newsweek. Only five articles of a scientific nature were found in the seven issues of the Des Moines Register examined, so all of these were used. Only four science articles were found in the two issues of Saturday Review examined; therefore, a fifth one was chosen from the February 22nd issue.

In the literature/expression category, feature articles, fiction, and reviews of literature and the arts were included. Five articles of this type were selected from the Des Moines Register, Reader's Digest, Saturday Review, and Time and Newsweek.

In the social studies area, the above procedure was used to select five articles from Reader's Digest and five from Saturday Review. However, a slightly modified procedure was used to select social studies articles from the other three sources. For Time and Newsweek the social studies articles were classified into five subgroups: politics, religion, economics, sociology and behavior. One article was randomly chosen from within each of these five subgroups.

The social studies articles for the Des Moines Register were classified into four subgroups: (1) headline articles; (2) first-page articles; (3) editorials; and (4) editorial columns. Two editorials were randomly selected and one article was randomly chosen from each of the other three subgroups.

The specific articles used from each of the above sources are listed in the Appendix.

In addition to the reading materials described above, it was felt that a comparison of the ITED reading passages with high school textbooks would be informative. Eighteen textbooks, six each from the fields of social studies, science, and language arts and literature were selected. Within each content area, two textbooks primarily intended for 9th grade students, two for 10th grade students, and two for 11th and 12th grade students were chosen. These texts were not selected on a random basis. Rather, members of the College of Education faculty at the University of Iowa who were teaching methods courses in the three curriculum areas were asked to identify textbooks that were fairly widely used within the state of Iowa. The textbooks used in this study were then chosen from these lists. The specific textbooks selected are noted in the Appendix.

Procedures for Estimating Readability Levels

Readability indices were needed for the reading passages of the ITED,⁵ the articles from the Des Moines Register, the articles

⁵For Tests E, SS, and NS, all reading passages were used. However, for Test L the poems and dramatic excerpts were not analyzed. Since the difficulty of such material is due more to imagery, format, etc., than to vocabulary and sentence structure, the formulas used in the study are not appropriate for them.

from the periodicals, and the textbooks. In order to calculate the four indices identified previously, the following values were needed for each passage, article, or book:

- (1) average sentence length in words
- (2) percent of words not appearing on the Dale list of 3000 words
- (3) average number of syllables per 100 words
- (4) percent of polysyllables
- (5) number of polysyllables per 10 sentences

These values required the following counts for each passage:

- (1) number of sentences
- (2) number of words
- (3) number of polysyllables
- (4) number of words not on the Dale list
- (5) number of syllables

For the ITED passages and the newspaper and journal articles the necessary data were obtained using the entire passage or article. For the textbooks, random samples of material were selected. Each textbook was first divided into thirds. Then, a page from the first third was chosen at random and starting with the first complete sentence a reading segment of approximately 400 words was used to obtain the necessary counts.⁶ Likewise, another page was randomly selected from the last third of the text and the necessary data were collected. These two sets of data were combined before the readability indices were computed.

⁶Pages of poetry and drama were not sampled from the literature books.

Two readers independently made the necessary counts, except for the Dale list count. To insure some degree of consistency, they employed the following operational definitions of terms:

- (1) A group of words was considered to be a sentence if the group ended in a period, exclamation point, question mark, or semicolon. If the word group ended in a colon, it was regarded as a sentence if the words constituted an independent clause.
- (2) A word was delineated by a space at each end. This implied that a hyphenated word was one word.
- (3) Numbers, symbols, and money figures (e.g., \$200) all consisted of one syllable.
- (4) The instructions given with the Dale list (Dale and Chall, 1948b) define most of the words on and off the list. Two readers simultaneously read through a passage and together decided upon the classification of words that were not clearly covered by the directions, always trying to stay within the spirit of the instructions.

The initial counts for the two readers were compared and recounts were made to resolve any differences. The readability indices for each reading segment then were computed from these agreed upon counts.⁷

Results and Discussion

Each of the external sources described previously provides normative data with which the ITED passages may be compared. The readability scores for the materials considered in this study are summarized in Tables 2, 3, and 4. These tables contain the range

⁷ This procedure was followed for all materials except textbooks. For the textbooks the initial counts of each reader were used to compute readability scores for a given formula. If these readability scores differed by .2 or more, recounts were made. Otherwise, the average of the two readability indices was reported.

of the readability scores and the mean readability scores for each set of materials and for each of the four formulas defined above. The specific readability score for each passage and each formula is given in the Appendix.

For each of the external sources of reading materials, except textbooks, the values given in Tables 2, 3, and 4 are based on five readability scores; the textbook values are based on six scores. The range and mean values for the ITED materials are derived from either eight scores (SS and NS) or twelve scores (literary materials - four for L and eight for E).

Before the data in Tables 2, 3, and 4 are discussed, it seems important to examine, very briefly, how these readability scores will be interpreted. If these scores represented grade levels, then the interpretation of individual scores and differences between scores would be fairly straightforward. As we have previously noted, however, such an interpretation is extremely unrealistic. In fact, the inappropriateness of such an interpretation was the major reason for developing a normative frame of reference for evaluating the readability scores for the ITED passages. However, even this normative frame of reference does not completely resolve the problems. For example, if the SMOG formula gives a readability score of 8.5 for a reading passage on the ITED and a score of 8.8 for an article in the Des Moines Register, how should this difference be interpreted? What are the implications of such a difference? These questions are not easily answered at this

TABLE 2 Ranges and Means of Readability
Scores for Social Studies Materials

Sources	Formula							
	FOG		SMOG		Flesch		Dale-Chall	
	Range	Mean	Range	Mean	Range	Mean	Range	Mean
Des Moines Register	6.28-7.10	6.67	8.55-10.25	9.36	5.33- 8.43	6.78	6.26-8.08	7.11
Time/Newsweek	5.87-7.18	6.47	8.08-10.40	9.13	6.03-10.53	8.08	5.97-7.60	6.95
Reader's Digest	6.06-6.86	6.47	8.44- 9.79	9.14	6.37- 7.68	6.83	5.76-6.88	6.36
Saturday Review	6.92-7.89	7.36	9.96-11.60	10.71	7.16- 9.88	8.26	6.35-7.41	6.89
Textbooks	5.32-7.03	6.15	7.08-10.17	8.59	5.63- 7.25	6.43	5.47-7.66	6.39
ITED	5.46-6.89	6.18	7.37- 9.73	8.56	5.70- 7.41	6.50	5.65-7.38	6.74

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TABLE 3 Ranges and Means of Readability Scores
for Science Materials

Sources	Formula							
	FOG		SMOG		Flesch		Dale-Chall	
	Range	Mean	Range	Mean	Range	Mean	Range	Mean
Des Moines Register	6.01-6.68	6.38	8.34- 9.53	8.95	6.08-7.13	6.62	6.03- 7.13	6.58
Time/Newsweek	5.60-7.11	6.47	7.56-10.30	9.14	6.53-7.20	6.94	6.35- 8.23	7.30
Reader's Digest	5.92-6.43	6.25	8.18- 9.07	8.76	6.20-6.78	6.57	5.91- 7.07	6.46
Saturday Review	6.32-7.94	7.01	8.68-11.68	10.00	6.65-8.31	7.53	6.05- 7.95	7.06
Textbook	5.45-6.96	6.08	7.34-10.00	8.44	5.57-7.06	6.35	6.29- 8.02	7.10
ITED	5.74-6.63	6.21	7.87- 9.44	8.67	6.35-6.92	6.58	6.78- 8.05	7.38

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TABLE 4 Ranges and Means of Readability
Scores for Literary Materials

Sources	Formula							
	FOG		SMOG		Flesch		Dale-Chall	
	Range	Mean	Range	Mean	Range	Mean	Range	Mean
Des Moines Register	4.47-6.64	5.29	5.54- 9.46	6.91	4.47-6.92	5.41	4.95-5.63	5.17
Time/Newsweek	6.42-7.11	6.84	9.00-10.22	9.65	6.53-7.48	7.12	6.73-7.71	7.31
Reader's Digest	4.72-6.90	5.83	6.04- 9.91	7.98	4.96-7.35	6.13	5.03-7.40	6.17
Saturday Review	5.60-7.39	6.56	7.62-11.26	9.28	5.70-7.87	6.67	5.41-6.67	6.05
Textbook	4.80-5.88	5.27	6.06- 7.97	6.97	4.90-6.03	5.38	5.32-6.23	5.79
ITED (Tests L and E)	4.83-6.45	5.74	5.82- 9.21	7.60	4.83-6.98	5.88	5.31-7.24	6.25

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time. Given our current knowledge of the meaning of scores from such formulas, it seems best always to interpret the values in a relative sense. For example, in Table 2 the FOG scores for the Des Moines Register range from 6.28 to 7.10 with a mean of 6.67. In this instance, the lowest FOG score is greater than the mean score for the ITED passages (6.18). In this situation, it does not seem unreasonable to describe the readability of the ITED social studies materials as "somewhat" lower (i.e., easier to read) on the average than the Des Moines Register materials. Throughout the remaining part of this paper, we will interpret the ITED readability scores in this relative fashion. Since our major concern in this study is to ascertain whether or not the ITED passages are representative (in terms of readability levels) of the materials students will read in and out of school, the use of this normative approach seems valid.

In the next three parts of this section, the relationships between the reading levels of the ITED passages and the reading levels of the external materials are discussed. The social studies materials, the science materials, and the literary materials are considered separately. The conclusions reached on the basis of the data in Tables 2, 3, and 4 are related to those given in an earlier study of the reading levels of the ITED (Forsyth and Michaels, 1975), and final conclusions are made on the basis of the results of both studies.

Social Studies Test Passages

In Table 2 it can be observed that for the FOG, SMOG, and Flesch formulas the mean ITED readability scores are lower than the means of all other materials except textbooks. For these indices the ITED means and the textbook means are very similar (maximum difference is .07).

When the Dale-Chall index is considered, the ITED mean is (1) slightly lower than the means for the Des Moines Register, Time/Newsweek and Saturday Review and (2) slightly higher than the means for Reader's Digest and textbooks. Even for the Dale-Chall index, the highest readability score for the ITED passages was lower than the highest score for textbooks.

On the basis of these mean values and a comparison of the lowest and highest score for each index and each set of materials, it seems reasonable to conclude that the readability levels of the social studies passages on the ITED are very similar to those of other social studies materials students are likely to read both in and out of school. If there are any differences between the readability of these external materials and the ITED passages, it would seem that, on the average, the ITED passages may be slightly easier (i.e., lower readability scores) to read.

The above conclusion is very similar to the one reached in the preliminary study referred to earlier (Forsyth and Michaels,

1975). In that study the ITED readability scores for the social studies passages were compared to other materials reported in published research. Specifically, metropolitan and non-metropolitan newspapers, journals varying from youth magazines to trade magazines, and related textbooks served as reference points for interpreting the ITED readability indices. On the basis of their comparisons, Forsyth and Michaels stated (p. 24):

... it seems reasonable to conclude that the reading level of the SS passages is comparable to the reading level of social studies materials that students are likely to encounter both in and out of the classroom.

Natural Science Test Passages

When readability is measured by the FOG, SMOG, and Flesch formulas, the mean readability scores for the science passages of the ITED are similar to the mean scores for textbooks (See Table 3). For the other materials the mean scores for the ITED passages are lower in 11 of the 12 possible comparisons. [The mean Flesch score for Reader's Digest is 6.57 as compared to the ITED mean of 6.58.] For the Dale-Chall index, the ITED mean is (1) approximately the same as the means of the textbooks, Saturday Review, and Time/Newsweek and (2) somewhat higher than the means for the Des Moines Register and the Reader's Digest.

In general, the data in Table 3 support the conclusion that the readability levels of the science passages are similar to science reading material students are likely to encounter. This

conclusion is similar to that reached by Forsyth and Michaels (1975). In their study, the readability levels of the NS passages were found to be similar to the readability levels of several journals (e.g., Popular Electronics, Farm Journal), instructor manuals, trade magazines, and textbooks.

English and Literature Test Passages

With reference to the data presented in Table 4, it is important to note that no 12th grade textbooks were selected for study in this area. The three language arts texts were intended for 9th, 10th, and 11th grade students. Likewise, the set of three literature textbooks did not include a 12th grade text. Thus, it seems reasonable to conclude that the textbook means would have been slightly higher had these 12th grade texts been included.⁸

From Table 4, it can be seen that the mean readability score for the ITED passages is always somewhat lower than the mean of Time/Newsweek, Reader's Digest, and Saturday Review when the FOG, SMOG, and Flesch formulas are used. For these indices, the mean values for the Des Moines Register and textbooks are lower than the ITED means.

When the Dale-Chall index is used, the ITED mean score is somewhat lower than the Time/Newsweek mean and approximately the same as the Reader's Digest and Saturday Review mean scores.

⁸ In the Appendix, however, it can be seen that the highest estimated readability level is not always associated with the textbook for the highest grade.

However, the textbook mean and the Des Moines Register mean are somewhat lower than the ITED mean.

It can be seen in Table 4 that for all formulas the lowest readability score for the ITED passages is very similar to the lowest score for textbooks. However, the highest ITED score is always greater than the highest readability score for textbooks. As noted previously, no 12th grade textbooks were included. If such texts had been sampled, the four sets of indices for textbooks and ITED may have been even more comparable.

Forsyth and Michaels (1975) compared the readability of the L and E passages with a variety of literary materials. They stated (p. 27):

... it can be concluded that the expression and literature test passages are more difficult than youth and "pulp" magazines, similar to women's magazines in difficulty, less difficult than the literature and rhetoric textbooks cited, and far less difficult than the Great Books reviewed.

Thus, on the basis of the data in Table 4 and the results from this earlier study, the conclusion that the readability levels of the ITED literary passages is similar to other literary type materials that students may read seems warranted.

A Concluding Statement

A study of this type must necessarily employ random samples of materials from various sources, and such samples would be expected to vary in average readability levels. Some samples would have had higher readability "scores" and some lower "scores". It

seems highly unlikely that the overall conclusions reached on the basis of the data in this study would have been different had we selected a different random sample of materials. This seems particularly true since the results of an earlier study that used different external reading materials supported the general conclusions of this study.

Thus, in summary, if it is assumed that the external sources used in the study are representative of the types of materials high school students are likely to meet, and if it is assumed that the readability level of the ITED passages should be comparable to such external materials, then it seems reasonable to conclude that the reading level of the ITED passages are of an appropriate level for high school students.

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Appendix

SOCIAL STUDIES SAMPLES

Readability Scores

	Dale-Chall	Flesch	FOG	SMOG
<u>Des Moines Register</u>				
headline article: Ford for Peace..., 2/5	8.08	7.08	6.93	9.95
second front-page article:				
Second Drop in Consumer Borrowing, 2/6	6.84	6.84	6.51	9.25
editorial: Ownership and access, 2/7	7.26	8.43	6.28	8.80
editorial: President's economic forecast, 2/5	6.26	5.33	6.51	8.55
columnist: Denis Warner, 2/3	7.12	6.20	7.10	10.25
<u>Time/Newsweek</u>				
Dissension among Democrats, <u>Time</u> , 2/3 p. 9	7.60	10.53	6.24	8.69
The Siege of Phnom Penh, <u>Newsweek</u> , 2/10 p. 25	5.97	8.78	5.87	8.08
Rationing: Some Pros—but a lot of Cons,				
<u>Time</u> , 2/3 p. 15	7.26	7.95	6.52	9.24
Extending the Vow, <u>Time</u> , 2/10 p. 46	7.18	7.12	7.18	10.40
School of the Future, <u>Newsweek</u> , 2/10 p. 44	6.74	6.03	6.52	9.25
<u>Reader's Digest</u>				
Safer with a Gun? Don't Believe It!				
2/75 p. 136	6.35	6.37	6.23	8.74
"We Was Here First!" 2/75 p. 140	5.76	7.18	6.42	9.03
What the New Pension Reform Act Means to				
You, 1/72 p. 85	6.14	6.53	6.06	8.44
Censorship--Where Do We Draw the Line?				
1/75 p. 93	6.88	6.40	6.76	9.68
What Progress Toward Church Reunion?				
1/75 p. 108	6.67	7.68	6.86	9.79
<u>Saturday Review</u>				
Cloaks-and-Daggers and the U.S. Consti-				
tution, 2/8 p.2	6.67	7.46	7.35	10.73
The Public College Tuition Flap, 2/8 p. 49	6.91	9.88	7.37	10.73
O.E.C.D. Revises View of Growth..., 2/8 p. 59	7.41	9.35	7.89	11.60
The Mood of Europe..., 1/25 p. 14	6.35	7.16	6.92	9.96
The Predicament of Developing Countries,				
1/25 p. 18	7.13	7.44	7.25	10.54

Readability Scores

Textbooks

Bragdon, H. and McCutchen, S. <u>History of a Free People</u> . New York: The Macmillan Company, 1967.	6.27	6.79	6.51	9.22
Dimond, S. and Pflieger, E. <u>Civics for Citizens</u> . New York: J. B. Lippincott Co., 1970.	5.47	5.63	5.32	7.08
Harriss, C. <u>Economics, An Analytical Approach</u> . (new edition) Lexington, Mass.: Ginn and Company, 1974.	6.60	6.15	5.80	7.97
McClenaghan, W. <u>Magruder's American Government</u> . (revised edition) Boston: Allyn and Bacon, Inc. 1968.	7.66	6.75	6.47	9.16
Mehlinger, H. and Patrick, J. <u>American Political Behavior</u> . Lexington, Mass.: Ginn and Company, 1970.	5.72	5.99	5.78	7.93
Todd, L. and Curti, M. <u>Rise of the American Nation, Volume Two: From 1865 to the Present</u> . New York: Harcourt, Brace and World, Inc., 1968.	6.63	7.25	7.03	10.17

ITED PASSAGES

Form Y-6

page 16	6.34	5.76	5.46	7.37
page 18	6.99	7.41	6.78	9.62
page 20	6.44	6.50	6.22	8.40
page 21	6.90	6.80	6.89	9.73

Form X-6

page 16	5.65	5.70	5.49	7.41
page 18	7.38	6.51	6.17	8.57
page 20	7.03	6.49	6.16	8.58
page 21	7.22	6.79	6.27	8.77

SCIENCE SAMPLES

Readability Scores

	Dale-Chall	Flesch	FOG	SMOG
<u>Des Moines Register</u>				
Advise early weening for beef cattle, 2/2 p. 4F	6.81	6.59	6.22	8.61
Don't cut rations, specialist tells farmers, 2/2 p. 6F	6.65	6.08	6.01	8.34
Prehistoric sea creatures fossils found in Iowa, 2/3 p. 1	6.03	6.29	6.38	8.91
Sugar cause of child ill, 2/4 p. 9	7.13	7.00	6.62	9.36
Additives in baby food assailed by study groups, 2/5 p. 1	6.30	7.13	6.68	9.53
<u>Time/Newsweek</u>				
Computerized Star, <u>Time</u> 2/3 p. 51	7.52	7.05	6.82	9.79
Plug-In Heart Pump, <u>Time</u> 2/10 p. 53	7.17	6.53	6.02	8.32
News from the Heart Front, <u>Newsweek</u> 2/3 p. 39	7.22	7.07	6.82	9.75
That Sinking Feeling, <u>Newsweek</u> 2/3 p. 61	6.35	6.87	5.60	7.56
The Scent of Sex, <u>Newsweek</u> 2/3 p. 61	8.23	7.20	7.11	10.30
<u>Reader's Digest</u>				
Is Your Sex Life Going Up In Smoke? 1/75 p. 104	5.91	6.20	5.92	8.18
Thermography--A Fabulous New Way of "Seeing," 1/75 p. 130	6.27	6.47	6.26	8.80
The Corn That Could Change the Lives of Millions, 1/75 p. 144	6.75	6.78	6.43	9.07
The Ghostly Menace of Fog, 2/75 p. 169	6.29	6.65	6.36	8.91
Do We Eat Too Much Meat? 2/75 p. 195	7.07	6.74	6.28	8.82
<u>Saturday Review</u>				
Digital Tuners: Threading FM Through a Needle's Eye, 1/25 p. 53	6.62	6.74	6.32	8.68
Second Wind, 2/8 p. 5	7.74	8.15	7.41	10.81
Knowledge of Insects: A Key to African Development, 2/8 p. 59	7.95	8.31	7.94	11.68
Global Report, 2/8 p. 60	6.05	6.65	6.32	8.73
Layman's Guide to the World of Psi, 2/22 p. 18	6.94	7.80	7.05	10.11

	Readability Scores			
	Dale-Chall	Flesch	FOG	SMOG
<u>Textbooks</u>				
<u>Biological Sciences Curriculum Study. High School Biology: BSCS Green Version.</u> (2nd edition) Chicago: Rand McNally and Co., 1968.	6.98	6.95	6.61	9.37
Fisk, F. and Blecha, M. <u>The Physical Sciences: Investigating Man's Environment.</u> River Forest, Ill.: Laidlaw Brothers Publishers, 1971.	6.33	5.78	5.47	7.35
Otto, J. and Towle, A. <u>Modern Biology.</u> New York: Holt, Rinehart and Winston, Inc., 1973.	7.10	6.11	5.69	7.73
Parry, R., Dietz, P., Tellefsen, R., and Steiner, L. <u>Chemistry: Experimental Foundations.</u> (2nd edition) Englewood Cliffs, N.J.: Prentice-Hall, Inc., 1975.	7.90	6.61	6.30	8.85
Ramsey, W., Burckley, R., Phillips, C., and Watenpaugh, F. <u>Modern Earth Science.</u> New York: Holt, Rinehart and Winston, Inc., 1973.	6.29	5.57	5.45	7.34
Toon, E. and Ellis, G. <u>Foundations of Chemistry.</u> New York: Holt, Rinehart and Winston, Inc., 1973.	8.02	7.06	6.96	10.00

ITED PASSAGES

Form Y-6

page 24	7.58	6.92	6.63	9.44
page 25	6.78	6.41	6.14	8.57
page 26	7.63	6.60	5.74	7.87
page 27	8.05	6.88	6.51	9.22

Form X-6

page 24	7.14	6.51	6.08	8.30
page 25	6.97	6.40	5.96	8.27
page 26	7.29	6.35	6.18	8.65
page 27	7.57	6.54	6.41	9.06

LITERATURE SAMPLES

Readability Scores

	Dale-Chall	Flesch	FOG	SMOG
<u>Des Moines Register</u>				
Her parade of joy, 2/2 p. 1C	4.95	4.76	4.67	5.66
Korean girl to Iowans: please write, 2/2 p. 1C	5.07	5.44	5.27	6.76
Adults belong at teenage parties, 2/2 p. 10E	5.03	4.47	4.47	5.54
Bach: 6 straight hours, 2/2 p. 3B	5.63	6.92	6.64	9.46
Choosing furniture for a minidining room, 2/6 p. 7	5.19	5.48	5.42	7.14
<u>Time/Newsweek</u>				
Let there be light, Newsweek 2/3 p. 42	6.73	6.53	6.42	9.00
Leapin' Lizards, Newsweek 2/10 p. 75	7.71	7.48	7.11	10.01
The road to nowhere, Time 2/10 p. 6	7.50	7.22	6.94	9.56
Caesar falls again, Time 2/10 p. 57	7.19	6.97	6.65	9.47
A crush on death, Time 2/10 p. 78	7.44	7.39	7.07	10.22
<u>Reader's Digest</u>				
Unforgettable Bill Benton, 1/75 p. 97	5.73	6.19	5.86	8.01
The Romantic Rebellion, 1/75 p. 123	7.40	7.35	6.90	9.91
Pied Piper of 'A' Company, 2/75 p. 67	5.03	4.96	4.72	6.04
Linda's Extraordinary Triumph and Rebirth, 2/75 p. 77	5.85	5.41	5.30	6.98
The Real Heroes, 2/75 p. 101	6.85	6.75	6.36	8.97
<u>Saturday Review</u>				
This Enchanted World, 1/25 p. 8	5.41	5.84	5.60	7.62
The Evening Colonnade, 1/25 p. 41	6.12	6.42	6.47	9.13
Curmudgeon-At-Large, 1/25 p. 55	5.53	5.70	5.67	7.73
The Life and Death of Mary Wollstonecraft, 2/8 p. 29	6.67	7.87	7.65	11.26
King James VI and I, 2/8 p. 30	6.51	7.51	7.39	10.65

Textbooks	Readability Scores			
	Dale-Chall	Flesch	FOG	SMOG
Guth, H. P. and Schuster, E. H. <u>American English Today: The Tools of English</u> 9. New York: Webster Division/McGraw Hill Book Co., 1970.	6.23	5.87	5.65	7.70
— <u>American English Today: The Structure of English</u> 10. New York: Webster Division/McGraw Hill Book Co., 1970.	5.71	5.12	5.32	7.09
— <u>American English Today: The Uses of Language</u> 11. New York: Webster Division/McGraw Hill Book Co., 1970.	6.20	5.38	5.14	6.80
Bennett, R., Evans, V., and Gordon, E. <u>Types of Literature</u> . (new edition) Lexington, Mass.: Ginn and Company, 1975.	5.19	4.90	4.85	6.06
Portor, A., Terril Jr., H., and Gordon, E. <u>American Literature</u> . (new edition) Lexington, Mass.: Ginn and Company, 1975.	6.09	6.03	5.88	7.97
White, E., Wolford, J., and Gordon, E. <u>Understanding Literature</u> . (new edition) Lexington, Mass.: Ginn and Company, 1975.	5.32	4.97	4.80	6.19
ITED PASSAGES: TEST E				
<u>Form Y-6</u>				
page 2	6.44	6.30	6.02	8.30
page 5	7.24	6.86	6.45	9.11
page 7	6.91	6.98	6.51	9.21
page 8	5.38	5.50	5.39	6.74
<u>Form X-6</u>				
page 2	6.98	6.61	6.35	8.95
page 5	5.81	5.08	4.83	6.05
page 7	5.48	5.13	5.45	6.14
page 8	5.31	4.83	4.84	5.82

ITED PASSAGES: TEST L

	Readability Scores			
	Dale-Chall	Flesch	FOG	SMOG
<u>Form Y-6</u>				
page 28	6.34	5.69	5.54	7.52
page 30	6.95	5.82	5.80	7.93
<u>Form X-6</u>				
page 28	6.18	6.03	5.81	7.92
page 30	5.99	5.77	5.85	7.57